P-18-2

Radar Upgrade (Version 2)

Purpose

The P-18 radar modernisation programme is proposed to replace vacuum-tube components with solid-state technology and improve the radar performance.

Composition

Equipment to be modernised includes:

- active jamming suppression equipment;
- digital passive interference suppression equipment;
- transmitter control display and automatic frequency control amplifier;
- automatic radar data reading and recording equipment;
- receiver and coherent local oscillator.

Basic specifications

Target detection range (POD=0.8), km:	
RCS = 2.6 sq.m, active noise directed-barrage jamming spectral density = 200 W/MHz generated by four jammers from 200-km range and 10,000-m altitude:	
at 3,000 m	84
at 10,000 m	150
at 20,000 m	162
Number of suppressed directions	4
Active noise jamming suppression ratio, dB, not less than	23*
Clutter suppression ratio, dB, not less than	26
Asynchronous jamming suppression ratio, not less than	20
Simultaneous suppression ratio, times, not less than:	
passive jamming	20
asynchronous jamming	20
Receiver operating frequency adjustment	electronic
Automatic radar data display and target tracking	available
Automatic jamming source tracking	available
Throughput (targets processed within a 10-sec scanning cycle	up to 120 (automatically)

* - with jamming/noise ratio of 25 - 40 dB

1L117M

Mobile 3D Radar

Mission

The 1L117M mobile 3D radar is designed to detect, identify and measure three coordinates (azimuth, slant range and altitude) of various aerial targets, as well as to provide radar data for external users.

The radar can be used as part of air defence and air force automated and non-automated air defence and air traffic control systems.

The 1L117M radar differs from its predecessor 1L117 radar by having the transmitter's klystron-based power amplifier, which enhances stability of emitted signals, increases passive noise suppression characteristics and improves the radar's ability to detect low-flying targets. In addition, frequency agility improves the radar's jamming resistance when operating in heavy ECM environment.

Composition

The radar equipment is mounted on five vehicles:

- vehicle No. 1 – transceiver;
- vehicle No. 2 – control and datalink equipment and operators' workstations;
- vehicle No. 3 – diesel-electric power plant with two diesel generators;
- vehicles Nos 4 and 5 – trailers to carry antenna systems and an SPTA set.

The radar has an all-weather capability and can operate in various climates at ambient temperatures between –40°C and +50°C, in relative humidity 98% and at an altitude above sea level amounting to 3,000 m.

The radar can be transported by automobile, railway and sea transport.

Basic specifications	
Waveband	centimetric
Coverage area:	
range, km	350
elevation, deg	28
azimuth, deg	360
Detection range (target RCS = 1 sq.m, jam-free environment), km, not less than:	
at 500 m	70
at 3,000 m	140
at 5,000 - 15,000 m	180
Detection range (target RCS = 10 sq.m, jam-free environment), km, not less than:	
at 500 m	70
at 3,000 m	160
at 8,000 m	280
at 10,000 - 25,000 m	320
Coordinates measurement accuracy (target RCS = 10 sq.m):	
range, m	150
azimuth, ang.min	7
altitude, m	400
Number of target tracks	not less than 200
Clutter rejection ratio, dB	not less than 45
Mean time between failures, hrs	not less than 350
Deployment/out-of-action time, hrs	not more than 8

PROTIVNIK-GE

Track Data Processing Radar

Mission

The Protivnik-GE 3D decimetric-waveband track data processing radar is designed to detect, determine coordinates and track strategic and tactical aircraft, ASALM-type missiles, small-size low-speed aircraft; classify and identify them as friend or foe; to take bearings of jamming sources; to designate targets to fighter aircraft and air defence missile systems.

The Protivnik-GE 3D track data processing radar can be used as part of automated and non-automated air force and air defence command and control systems.

Features

- digital phased array antenna
- highly automated combat operation
- high jamming immunity
- no field adjustment/tuning is required
- continuously operating automated built-in functional testing and fault detection system
- display of all necessary information on a wide-scope colour TV indicator
- automated mapping of local objects and passive interferences

Composition

The radar consists of equipment unit, antenna/instrumentation unit and autonomous power supply system.

A four-seat remote post can be delivered. Data is transferred to the remote post via a fibre-optic line at a range of up to 1,000 m from the radar.

The radar can operate in various climates, at a relative air humidity of 95% and a wind speed of up to 30 m/s, at an altitude of 2,000 m above sea level. The radar can be shipped by sea and air, automobile and railway transport.

The Protivnik-GE radar is similar in basic specifications to the best foreign radars of this class, yet outperforms them as regards altitude and elevation operational limits, elevation measurement accuracy. It provides higher scanning rate and detection altitude limit, thus being capable of acquiring high-speed air targets with ballistic flight trajectories.

Basic specifications	
Waveband	decimetric
Surveillance zone:	
range, km	10 - 400
azimuth, deg	360
altitude, km	200
elevation, deg	45
target speed, km/h	60-8,000
Target detection range (RCS = 1.5 sq.m), km:	
at 100 m	40
at 1,000 m	100
at 5,000 m	240
at 12,000 - 80,000 m	340
Coordinates measurement accuracy:	
range, m	100
azimuth, ang. min	12
elevation, ang. min	10
Number of target tracks	150
Natural clutter rejection ratio, dB	50
Mean time between failures, hrs	not less than 600
Deployment time, min	40

67N6E GAMMA-DE

Radar

Mission

The 67N6E Gamma-DE target acquisition radar is designed to effectively acquire, identify, measure 3D coordinates and track a wide variety of modern and prospective air attack assets, including high-altitude low-observable air-launched missiles (targets) in severe ECM and clutter conditions, as well as to receive data from aircraft fitted with the ICAO-code transponders.

The Gamma-DE mobile high-energy medium- and high-altitude fully solid-state radar can be operated within automated and non-automated command and control posts of air force and air defence units, or in civil air traffic control systems as enroute surveillance radar. It can also be used in various military and civil-purpose applications, for combat training and combat air operations, as a mobile radar of a rapid deployment force reserve.

Features

The radar features modular design, phased array antenna, solid-state transmitters of different transmitting power, digital data processing, and good repairability. It can use data from external intelligence sources.

Composition

The radar comprises a phased-array antenna with the turntable, an operator's cabin housing electronic equipment and a spare parts, tools and accessories set, a diesel power plant with two diesel-generators, and a self-contained power source for the operator's cabin.

A remote control equipment kit can be provided for setting up at unit command posts to ensure radar operation at a distance of up to 15 km away with datalink coupling. The kit also allows the crew to operate from the cabin moved 1,000 m away from the rotating antenna unit and sheltered in an emplacement.

The Gamma-DE is an all-weather radar operating in various climates at temperatures between -50°C and +50°C, with relative humidity of 98%, wind speed up to 25 m/s and above-sea-level altitude amounting to 2,000 m. The radar is fitted with an automatic test and monitoring equipment, air conditioning, automatic fire-alarm and fire-extinguishing systems, other technical support assets. It can be airlifted/transported by air, sea, railway or road.

Basic specifications	
Waveband	decimetric
Coverage area:	
range, km	10 - 400
elevation, deg	-2...+60
azimuth, deg	360
altitude, km	120
Target acquisition range, km:	
RCS = 1 sq.m	up to 400
RCS = 0.1 sq.m	up to 240
Coordinates measurement accuracy:	
range, m	60 - 100
azimuth, ang. min	10 - 11
elevation, ang. min	15 - 18
Number of tracked targets	not less than 200
Natural clutter rejection ratio, dB	50
Mean time between failures, hrs	1,000
Deployment time, min	20
Continuous operation time, hrs	72

64L6E GAMMA-S1E

Radar

Mission

The 64L6E Gamma-S1E radar is designed to acquire and track a wide spectrum of up-to-date and prospective air threats, including air-launched missiles, in conditions of natural clutter and electronic countermeasures, to operate as part of air force/air defence automated command and control systems, non-automated units and rapid reaction forces, as well as to transmit data to automated control posts and civil aviation air traffic control facilities. The radar can classify single targets, such as aircraft, missiles and decoys, by their signatures.

The Gamma-S1E mobile 3D phased-array radar can be used as part of various military (automated control systems and non-automated units) and civil systems, for combat training and combat air operations, and as a task force mobile radar.

Features

The radar features a planar phased-array antenna, modular design, ability to be integrated into various automated control systems, availability of remote control equipment and ability to control the radar from shelters, ECCM protection against anti-radar missiles, automated built-in functional testing and single-mission crew training assets.

Basic specifications	
Waveband	centimetric
Radar coverage:	
range/special mode, km	10-300/400
elevation, deg	-2...+30
azimuth, deg	360
altitude, km	not less than 30
Coordinates measurement accuracy:	
range, m	50
altitude, m	400
azimuth, ang. min	15
elevation, ang. min	10 - 15
Number of tracked targets	not less than 100
Natural clutter rejection ratio, dB	not less than 45
Mean time between failures, hrs	500
Standard/emergency turn-on time, min	5/3
Deployment/out-of-action time, min	40

Composition

The radar comprises the M1 vehicle, mounting a phased-array antenna with an integral turntable, a transceiver and a ground radar interrogator; the M2 vehicle, mounting control, signal processing, data display, recording/print out facility, communications and datalink equipment; and the M3 vehicle, carrying spare parts, tools and accessories set; as well as two electric power plants in trailers, towed by M1 and M2 vehicles.

Provision is made for a four-operator remote control facility to control the radar from a distance of up to 1 km via a fibre-optic line or from 15km-distance - via a radiolink.

The Gamma-S1E is an all-weather radar operating in various climates at temperatures between -50°C and +50°C, in relative humidity totalling 98%, wind speed equalling up to 25 m/s and above-sea altitude amounting to 2,000 m. The radar is fitted with an automated testing/monitoring equipment, air conditioning, automatic fire-alarm and fire-extinguishing systems, other technical support assets.

The radar can be shipped by all means of transportation.